

**HINGE ASSEMBLY WITH A ROTATION SEAT AVAILABLE TO  
ROTATE IN BOTH LATITUDINAL AND LONGITUDINAL  
DIRECTIONS WITH RESPECT TO A FIXING SEAT**

1    BACKGROUND OF THE INVENTION

2    1. Field of the Invention

3            The present invention relates to a hinge assembly, and more particularly  
4    to a hinge assembly having a fixing seat and a rotation seat which is able to rotate  
5    in both the longitudinal and latitudinal directions with respect to the fixing seat.

6    2. Description of Related Art

7            Hinge devices have been used in many different structures to combine  
8    two objects together and to allow one object to pivot or rotate with respect to the  
9    other object. The existing hinge assemblies provide the ability for one object to  
10   pivot relative to the other object in only one direction. For example, the hinge  
11   used in a laptop computer to combine the monitor and the mainframe can only  
12   provide the monitor to pivot in the longitudinal direction in relation to the  
13   mainframe. Another example is the hinge device used in a camera. In a camera,  
14   the screen should be rotated freely to enable the operator to have the best angle to  
15   shoot the scene. However, with the conventional, the screen can only have  
16   latitudinal direction rotation ability when referring to the mainframe of the  
17   camera. Even though some manufacturers do provide a hinge device to provide  
18   one object to pivot relative to the other object in both the latitudinal and  
19   longitudinal directions, because there is no limitation to the rotation angle,  
20   structural damage is inevitable.

1           To overcome the shortcomings, the present invention tends to provide an  
2 improved hinge assembly to mitigate the aforementioned problems.

### 3 SUMMARY OF THE INVENTION

4           The primary objective of the present invention is to provide an improved  
5 hinge assembly having a fixing seat for fixing onto a first object and a rotation  
6 seat for fixing onto a second object which is pivotable to the first object. The  
7 rotation seat of the hinge device is able to rotate in a latitudinal direction with  
8 respect to the fixing seat. Also, two connection feet in the rotation seat are able to  
9 rotate in a longitudinal direction relative to the fixing seat such that a greater  
10 rotation angle is acquired for the operator.

11          Another objective of the present invention is to provide a positioning  
12 device between the fixing seat and the rotation seat so that when the rotation seat  
13 is rotated with respect to the fixing seat, the positioning device is able to provide  
14 a temporary positioning effect to the rotation seat.

15          Other objects, advantages and novel features of the invention will  
16 become more apparent from the following detailed description when taken in  
17 conjunction with the accompanying drawings.

### 18 BRIEF DESCRIPTION OF THE DRAWINGS

19          Fig. 1 is an exploded perspective view of the hinge assembly of the  
20 present invention;

21          Fig. 2 is a perspective view of the assembled hinge assembly of the  
22 present invention;

23          Fig. 3 is a schematic perspective view showing the application of the

1 hinge assembly of the present invention to a laptop computer;

2 Fig. 4 is a top plan view of the application of the hinge assembly in Fig.  
3 3;

4 Fig. 5 is a schematic side plan view showing that the monitor of the  
5 laptop computer is able to rotate in a latitudinal direction with respect to the  
6 mainframe of the laptop computer; and

7 Fig. 6 is a schematic perspective view showing the application of the  
8 hinge assembly of the present invention to a camera.

#### 9 DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

10 With reference to Fig. 1, it is noted that the hinge assembly in  
11 accordance with the present invention is composed of a fixing seat (1) and a  
12 rotation seat (2).

13 The fixing seat (1) includes an elongated fixing plate (11), a rotation  
14 shaft (12) and a limiting disk (13).

15 The fixing plate (11) has two fixing holes (111) respectively defined in a  
16 distal end of the fixing plate (11), a first through hole (112) centrally defined in  
17 the fixing plate (11) and two cutouts (113) oppositely defined in an inner face  
18 defining the first through hole (112).

19 The rotation shaft (12) includes two fixing feet (121) integrally formed  
20 on a bottom face of the rotation shaft (12) to correspond to the two cutouts (113)  
21 in the first through hole (112) of the fixing plate (11), a fixing flange (122)  
22 integrally formed on a mediate portion of the rotation shaft (12) and provided  
23 with two opposite notches (123) defined in an outer face of the fixing flange

1 (122).

2           The limiting disk (13) comprises two arcuate portions (13a,13b) with the  
3 same inner diameter and different outer diameter, wherein the outer diameter of  
4 the arcuate portion (13b) is larger than that of the arcuate portion (13a). The  
5 limiting disk (13) further has two L-shaped, downwardly extending limiting legs  
6 (131) oppositely formed on a side face of the arcuate half (13a) to correspond to  
7 the two notches (123) of the rotation shaft (12), two limiting edges (132) formed  
8 on a joint between the two arcuate portions (13a,13b) and at least two bosses  
9 (133).

10           The rotation seat (2) has a body (21) and leaf springs (22).

11           The body (21) has two oppositely formed tubes (211) each with a slit  
12 (212) to allow the tube (211) to be resilient, an extension (213) extending  
13 downward to correspond to either one of the two limiting edges (132) of the  
14 limiting disk (13), a second through hole (214) defined between the two tubes  
15 (211) to correspond to the rotation shaft (12) and having at least two opposite  
16 position recesses (215) defined in an inner face defining the second through hole  
17 (214) and two connection legs (216) respectively received in a corresponding  
18 one of the two tubes (211). It is noted that each tube (211) has a limiting block  
19 (2111) formed on a distal edge of the tube (211) and the connection leg (216) has  
20 a stop (2161) formed on an outer circumference of the connection leg (216) to  
21 correspond to the limiting block (2111).

22           With reference to Fig. 2 and still using Fig. 1 as a reference, when the  
23 hinge assembly of the present invention is in assembly, the two fixing feet (121)

1 of the rotation shaft (12) are inserted into the corresponding cutouts (113) in the  
2 first through hole (112) of the fixing plate (11) to fix the rotation shaft (12) on the  
3 fixing plate (11). Then the rotation shaft (12) is inserted through the limiting disk  
4 (13), the second through hole (214) and the leaf springs (22), wherein the  
5 limiting legs (131) of the limiting disk (13) are inserted into the corresponding  
6 notches (123) of the limiting flange (122) on the rotation shaft (12) to position  
7 the limiting disk (13) on the rotation shaft (12). Thereafter, the uppermost leaf  
8 spring (22) is riveted with a distal end of the rotation shaft (12) to securely  
9 sandwich the body (21) with the fixing plate (11).

10         After the assembly of the hinge assembly of the present invention, it is to  
11 be noted that because each connection leg (216) is inserted into the  
12 corresponding tube (211), the connection legs (216) are rotatable with respect to  
13 the body (21). However, due to the limiting block (2111) on the tube (211) and  
14 the stop (2161) on the connection leg (216), the rotation angle of the connection  
15 leg (216) is limited. Furthermore, because the rotation shaft (12) simply extends  
16 through the second through hole (214) of the body (21) and the body (21) is  
17 securely sandwiched between the leaf springs (22) and the limiting disk (13)  
18 which is securely positioned on the rotation shaft (12), the body (21) is rotatable  
19 with respect to the fixing plate (11). However, due to the provision of the  
20 extension (213) on the body (21) and the limiting edges (132), while the body  
21 (21) is rotated, the extension (213) will constantly engage with either one of the  
22 limiting edges (132) so that the rotation angle of the body (21) relative to the  
23 fixing plate (11) is limited.

1           With reference to Figs. 3, 4 and 5, when the hinge assembly of the  
2   present invention is applied to a laptop computer (3) having a monitor (31) and a  
3   mainframe (32), the rotation seat (2) is connected to the monitor (31) via the  
4   connection legs ((216) and the fixing seat (32) is connected to the mainframe (32)  
5   via the fixing plate (111). Then the monitor (31) is able to rotate in a latitudinal  
6   direction relative to the mainframe (32).

7           With reference to Fig. 6, when the hinge assembly of the present  
8   invention is applied to a camera (4) having a mainframe (41) and a screen (42),  
9   the rotation seat (2) is connected to the mainframe (41) via the connection legs  
10   (216) and the fixing seat (1) is connected to the screen (42) via the fixing plate  
11   (11). Then the screen (42) is able to rotate in a longitudinal direction relative to  
12   the mainframe (41).

13           In summary, no matter the rotation seat (2) is connected to a monitor or a  
14   mainframe of an electronic device, the hinge assembly of the present invention is  
15   able to provide rotation ability to the monitor in both the latitudinal and  
16   longitudinal directions with respect to the mainframe. Furthermore, in order to  
17   protect the electronic device, the rotation angle of the monitor in relation to the  
18   mainframe of the electronic device is limited via the limiting block (2111) and  
19   the stop (2161) and the extension (213) and the limiting edges (132).

20           It is to be understood, however, that even though numerous  
21   characteristics and advantages of the present invention have been set forth in the  
22   foregoing description, together with details of the structure and function of the  
23   invention, the disclosure is illustrative only, and changes may be made in detail,

- 1 especially in matters of shape, size, and arrangement of parts within the
- 2 principles of the invention to the full extent indicated by the broad general
- 3 meaning of the terms in which the appended claims are expressed.